ECOLOGY OF ORUAWAIRUA ISLAND, MARLBOROUGH SOUNDS, NEW ZEALAND

II. THE VEGETATION

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ABSTRACT

An outline of the vegetation and vascular flora is given for Oruawairua Island. The vegetation communities are described and mapped, and the adventive and planted species discussed along with the secondary successional trends involved as the once grazed grassland areas revert back to forest. An annotated list of 244 species, varieties, subspecies, hybrids or cultivars of vascular plants from the island is presented.

INTRODUCTION

This paper considers the vegetation of Oruawairua Island (Blumine Island) with emphasis on describing and mapping the various plant communities to provide a baseline study from which future patterns of secondary succession can be monitored.

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Extensive field observations and plant collections were made from the island. The mapping of the vegetation was aided by photographs and sketches taken from a boat, from vantage points on the island and from an aerial photograph of the island. The topography, geology, soils, climate and history of Oruawairua Island have been previously described (Conner and Conner 1981).

VEGETATION COMMUNITIES

Oruawairua Island was once covered in forest, though the majority was cleared for farming, except for an area at the head of Southern Bay (Conner and Conner 1981). Although most of the island would have been converted to grassland, much of it has already regenerated to scrub, with many forest species appearing in the damper gullies. There are four main plant communities: grassland, scrub, regenerating forest and mature forest (Fig.1). Although these are mapped and discussed as distinct entities, they often intergrade without definite boundaries. The approximate cover of each plant community is:

grassland	1%
scrub	56%
regenerating forest	24%
mature forest	19%

In addition there is a very distinct coastal plant community around the fringe of the island and several small areas of wetland vegetation not included in these categories.

GRASSLAND

Grassland communities only remain on a few ridge crests primarily on western aspects of the island and are composed mainly of adventive species. The dominating species include *Agrostis tenuis* (browntop), *Anthoxanthum odoratum* (sweet vernal) and *Bromus unioloides* (prairie grass), with other grasses (see species list) and various herbaceous dicotyledonous plants.

SCRUB

Much of the western side of the island is dominated by *Leptospermum* scrub (mainly *L. scoparium)* up to 5m tall. This occurs primarily on the more exposed areas such as ridges and upper slopes, but does not extend into the gullies. Where the *Leptospermum* scrub is less dense and only 1-3m high, other scrub species commonly present include: *Cassinia leptophylla* (tauhinu), *Cyathodes fasciculata* (mingimingi), *Erica lusitanica* (spanish heath) and *Olearia virgata* var. *serpentina,* as well as the ferns, *Paesia scaberula* (hard fern) and *Pteridium aquilinum* var. *esculentum* (bracken) and the grasses *Agrostis tenuis* and *Anthoxanthum odoratum.*

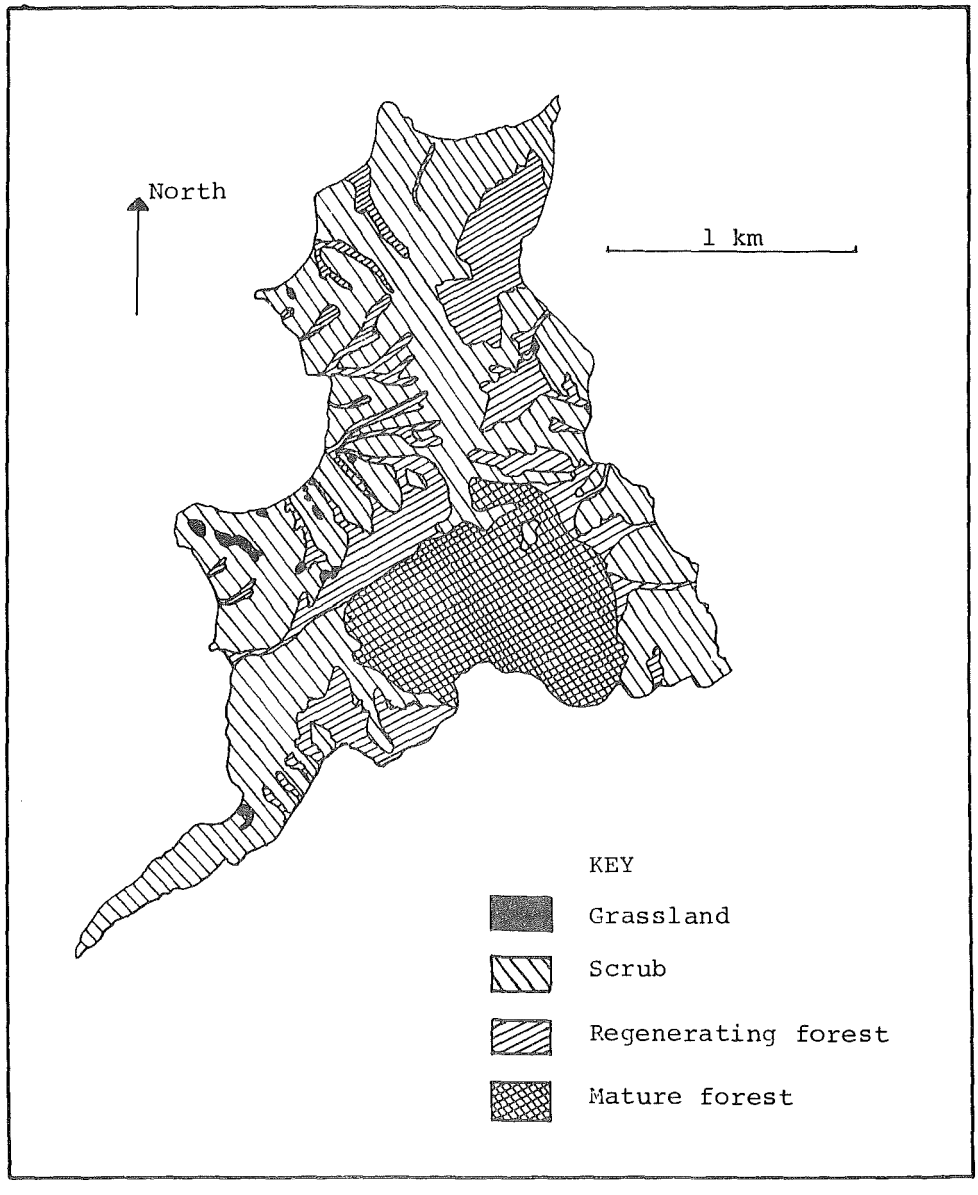

Fig. 1. The vegetation communities of Oruawairua Island. The terms grassland, scrub, regenerating forest and mature forest are used as described in the text. The coastal zone was too narrow to map.

In various places, especially near the coast, this low scrub gives way to *Phormium cookianum* (mountain flax) which often forms dense stands along with *Poa laevis* (silver tussock) and a mixture of the above scrub species.

Often the *Leptospermum* scrub becomes very dense with very few understorey species. However in taller, more mature stands, extensive thickets of *Lycopodium volubile* and/or *Pteridium aquilinum* var. *esculentum* are frequent. Also common in places are various *Coprosma* spp., *Gaultheria antipoda* and small plants of *Beilschmiedia tawa* (tawa), *Elaeocarpus dentatus* (hinau), *Myrsine australis* (mapou) and *Weinmannia racemosa* (kamahi).

REGENERATING FOREST

A mixed closed canopy vegetation consisting primarily of *Melicytus ramiflorus* (mahoe), *Pseudopanax arboreus* (five finger) and *Macropiper excelsum* (kawakawa) up to 10m tall, is found over much of the eastern and northern sides of the island and in the gullies on the western side (Fig.1). Other tree species are commonly associated with the main canopy species in places (e.g. *Coprosma* spp., *Cyathea dealbata* (silver fern), *Cyathea medullaris* (mamaku), *Dysoxylum spectabile* (kohekohe), *Elaeocarpus dentatus*, *Fuchsia excorticata* (konini), *Melicope ternata* (wharangi), *Pennantia corymbosa* (kaikomako), *Pseudopanax crassifolius* (lancewood), *Rhopalostylis sapida* (nikau), *Streblus heterophyllus* var. *elliptica* (milk tree) and *Weinmannia racemosa*. Underneath this canopy a variety of ferns and numerous vines flourish.

MATURE FOREST

This plant community appears to have remained untouched during the initial clearing of the island. The dominant species include: *Beilschmiedia tawa, Dysoxylum spectabile, Elaeocarpus dentatus, Podocarpus ferrugineus* (miro), *Podocarpus hallii* (Hall's totara), *Podocarpus spicatus* (matai), *Rhopalostylis sapida* and *Weinmannia racemosa*. In the understorey ferns are particularly common, both as epiphytes and on the forest floor. Small pockets of beech forest *(Nothofagus solandri* var. *cliffortioides* and *N. truncata)* grow on the higher ridges.

COASTAL VEGETATION

There is a narrow, but distinct plant habitat surrounding most of the island where the ridges abruptly drop to the sea. These rocky bluffs provide precarious sites for various herbaceous species, many of which are restricted to such sites. The most commonly represented species in this coastal zone are: *Apium australe* (New Zealand celery), *Arthropodium cirratum* (rock lily), *Disphyma australis* (horokaka), *Peperomia urvilleana, Rhagodia triandra* and *Senecio lautus*. Where the bluffs are not so steep, *Phormium cookianum*

is common along with various grasses and herbaceous dicotyledonous plants.

In the stoney bays, common shore plants include: *Coprosma* spp., *Hebe* spp., *Muehlenbeckia complexa* (pohuehue), *Myoporum laetum* (ngaio), *Plagianthus divaricatus* and *Ranunculus acaulis* (shore buttercup).

WETLANDS

Where small creeks flatten out near the coast, the drainage of water into the sea is often impeded in places by slightly raised shingle beaches. The moist areas around such creek mouths are characterised by the presence of *Carex coriacea, Cyperus ustulatus* and *Scirpus nodosus*.

ADVENTIVE AND PLANTED SPECIES

Except in the forested areas, exotic plants are widespread over Oruawairua Island, especially in the grassland and where the scrub is less dense. Many of these are closely linked with the previous farming and gardening activities on the island. Various introduced grasses are common in grassland and open sites or where the soil has been disturbed, along with herbaceous dicotyledonous plants such as *Anagallis arvensis* (scarlet pimpernel), *Centaurium erythraea* (centaury), *Crepis capillaris* (hawksbeard), *Dianthus armeria* (deptford pink), *Erigeron floribundus* (fleabane), *Hypochoeris radicata* (cat's ear), *Orobanche minor* (broomrape), *Plantago* spp. (plantains), *Rumex* spp. (docks) and *Silene gallica* (catchfly). Some of the grasses (e.g. *Lolium* spp.) were probably intentionally sown for grazing.

Of the naturalised woody plants, *Erica lusitanica* (spanish heath) and *Pinus radiata* (monterey pine) are widespread in the more open scrub areas of the northern and western sides of the island. Other woody exotics which are locally present include: *Acacia dealbata* (silver wattle), *Cytisus monspessulanus* (Montpelier broom), *Cytisus palmensis* (tree lucerne), *Cytisus scoparius* (broom), *Physalis peruviana* (cape gooseberry), *Rosa rubiginosa* (sweet briar), *Sambucus nigra* (European elder) and *Ulex europaeus* (gorse), along with the climber *Clematis vitalba* (old man's beard).

Many horticultural plants remain around the site of a previous cottage and are obviously the result of deliberate planting. Plants such as *Chamaecyparis lawsoniana* (lawson cypress), *Fuchsia magellanica, Malus pumila* (apple), *Morus nigra* (black mulberry), *Populus nigra* cv. 'Italica' (Lombardy poplar), *Pyrus communis* (pear), *Rosa* spp. (climbing roses), *Salix caprea* (willow), *Tamarix chinensis* (salt cedar) and *Trachycarpus fortunei* (windmill palm) which are only

represented by one or a few plants, can not be considered as naturalised. However, a number of others are becoming established either as seedlings or through vegetative means and therefore can be considered as naturalised on the island. These include: *Asparagus officinalis* (asparagus), *Crocosmia* x *crocosmiiflora* (montbretia), *Eucalyptus globulus* (Tasmanian blue gum), *Ficus carica* (fig tree), *Iris foetidissima* (stinking iris), *Kniphofia* sp., *Mentha suaveolens* (apple mint), *Plectranthes ciliatus, Prunus cerasus* (sour cherry), *Sambucus nigra* (European elder), *Solanum tuberosum* (potato) and *Zantedeschia aethiopica* (arum lily).

Numerous native species have also been planted at the site of the previous cottage and along the southwestern headland by the Wellington branch of the Forest and Bird Protection Society in 1961. The species planted included: *Brachyglottis repanda* (rangiora), *Coprosma robusta* (karamu), *Corynocarpus laevigatus* (karaka), *Hebe salicifolia, Hebe speciosa, Hoheria populnea* (lacebark), *Metrosideros excelsa* (pohutukawa), *Myoporum laetum* (ngaio), *Pittosporum tenuifolium* (kohuhu), *Sophora* sp. (kowhai) and over 120 *Dodonea viscosa* (akeake) as well as scattering seeds of a variety of tree species. Of these, no specimens of *H. populnea, M. excelsa* and *Sophora* sp. were recorded and probably never survived the initial planting. There are a few specimens of the other species still remaining at the planting sites and are presumably the original plants. As only single plants of *H. salicifolia* and *H. speciosa* were recorded on the island, both at the cottage site, they should not be considered indigenous to Oruawairua Island.

SUCCESSIONAL TRENDS

In general, the patterns involved in the secondary succession as the grassland reverts back to a forest cover can be summarised as: grassland → scrub → regenerating forest → mature forest. Such a successional sequence is particularly evident on the western side of the island. Along the successional gradient, the grassland merges gradually into scattered *Leptospermum* scrub (although a distinct boundary exists in some places) which becomes thick and dense with very little undergrowth when about 2-3m high. When the canopy reaches 4-5m high, numerous seedlings of broad-leaved tree species are common, which grow as canopy gaps provide sufficient light.

In some places *Pteridium aquilinum* var. *esculentum* (bracken) is invading the grassland and appears to be replaced by *Phormium cookianum* (mountain flax) or broad-leaved shrubs and trees, although *Leptospermum* scrub has occasionally developed where the *P. aquilinum* var. *esculentum* is less dense.

Progress along the successional sequence (grassland → scrub → regenerating forest) appears to be related to moisture availability. The taller scrub is found on the moister lower slopes and judging from its stature, has spread laterally up these slopes toward drier ridge crests. Grassland communities only remain on some of these latter sites. Broad-leaved species, which are probably more dependent on higher moisture availability for seedling survival, have become established in damper gullies and are spreading into the taller scrub. Establishment of broad-leaved species under the relatively closed canopies of taller scrub may be promoted by an increase in relative humidity beneath such canopies as a result of shade and some protection from evapo-transpiration.

The extent of the mature forest on Oruawairua Island has remained much the same over the past 30 years (compare Fig.1 of Conner and Conner (1981, this volume) and Fig.1 of this paper).

Regeneration on the eastern and southern sides of the island appears to be more advanced than on the western side. This is possibly related to two factors.

1. The western side of the island was probably more intensively farmed (as the cottage was on this side of the island).

2. Exposure of these aspects to the predominating westerly to nor-westerly winds (Conner and Conner 1981) would increase evapo-transpiration,thereby reducing seedling establishment on this side of the island.

If the current absence of grazing pressure on the island (Powlesland, 1981) remains, then progression along the outlined successional sequence would be expected to continue. In the near future, the most marked changes are likely to be:

1. The disappearance of the already small areas of grassland communities as a result of reversion to scrub.

2. Further increase in the area of regenerating forest as canopy gaps appear in the taller *Leptospermum* scrub.

THE FLORA

A total of 244 vascular plant species, varieties, subspecies, hybrids or cultivars were recorded on Oruawairua Island. A break-down of their composition is given in Table 1. All ferns and fern allies are native, as are most of the trees, shrubs, vines and scramblers. The majority of the adventive species are herbaceous

dicotyledons. The most common families are Asteraceae (6 shrubs and 12 herbaceous plants) and Poaceae (15 grasses).

TABLE 1. COMPOSITION OF THE ORUAWAIRUA ISLAND FLORA. NUMBER OF SPECIES, VARIETIES, SUBSPECIES, HYBRIDS AND CULTIVARS IN THE VARIOUS FLORISTIC GROUPS.

	Native	Adventive/ planted	Total
Ferns and fern allies	44	-	44
Trees and shrubs	63	25*	87
Vines and scramblers	12	4	16
Herbaceous dicotyledons	25	34	59
Herbaceous monocotyledons	22	16	38
Total	166	78	244

* includes *Hebe salicifolia* and *H. speciosa*.

Included in the checklist of vascular plants are a number of species included in the register of rare and endangered flora of New Zealand (Given 1976). They are *Olearia virgata* var. *serpentina*, *Pseudopanax ferox* and *Tetrapathea tetrandra*. It is surprising that *Griselinia littoralis* was not found on the island, especially since it is common on the neighbouring mainland (Martin 1932).

In the following species list, each species is categorised into one or more of the following previously described vegetation communities:

G - grassland
S - scrub
RF - regenerating forest
F - mature forest
C - coastal vegetation

Refer to Fig.1 of Conner and Conner (1981, this volume) for locations on the island. Introduced species are indicated with an asterisk. Specimens of most species have been deposited in the herbarium of the Department of Horticulture, Lincoln College.

VASCULAR FLORA OF ORUAWAIRUA ISLAND

FERNS AND FERN ALLIES

Adiantum cunninghamii Hook. (Adiantaceae) maidenhair fern	S, RF
Anarthropteris dictyopteris (Mett.) Cop. (Polypodiaceae)	RF, F
Arthropteris tenella (Forst.f.) Smith (Davalliaceae)	RF, F
Asplenium bulbiferum Forst.f. ssp. *bulbiferum* (Aspleniaceae)	RF, F
A. bulbiferum Forst.f. ssp. *gracillimum* (Col.) Brownsey.	RF, F
A. flabellifolium Cav. necklace fern	common in S, RF, F
A. flaccidum Forst. f. ssp. *flaccidum*	RF, F
A. hookerianum Col.	S, RF, F
A. hookerianum Col. var. *colensoi* (Col.) Moore	S, RF, F
A. oblongifolium Col.	RF, F
A. polyodon Forst. f.	RF, F
A. terrestre Brownsey ssp. *terrestre*	RF, F
Blechnum chambersii Tindale (Blechnaceae) = *B. lanceolatum* (R. Br.) Sturm	RF, F
B. filiforme (A. Cunn.) Ettingshausen	RF, F
B. fluviatile (R. Br.) Salom.	RF, F
B. "latifolium" = Lomaria latifolia Col.	edge of S, RF
Botrychium biforme Col. (Ophioglossaceae) parsley fern	G
Cheilanthes distans (R. Br.) Mett. (Adiantaceae)	C
C. sieberi Kunze	C
Ctenitis glabella (A.Cunn.) Cop. (Dryopteridaceae)	RF, F
Cyathea dealbata (Forst.f.) Swartz (Cyatheaceae) silver fern	common in RF, F
C. medullaris (Forst.f.) Swartz mamaku	common in RF, F
Grammitis ciliata Col. (Grammitidaceae)	epiphyte in RF, F
Histiopteris incisa (Thunb.) J.Smith (Pteridaceae) water fern,	in damp gullies of RF
Hymenophyllum demissum (Forst.f.) Swartz (Hymenophyllaceae)	rare in RF, F
H. sanguinolentum (Forst.f.) Swartz	rare in RF, F
Hypolepis sp. (Dennstaedtiaceae) rare,	in damp gully of RF
Lastreopsis velutina (A.Rich.) Tindale (Dryopteridaceae)	RF, F
Lindsaea cuneata (Forst.f.) C. Christen. (Lindsaeaceae)	RF, F
Lycopodium volubile Forst.f. (Lycopodiaceae) waewaekoukou	common in S
Paesia scaberula (A.Rich.) Kuhn (Pteridaceae) hard fern	common in G, S
Pellaea rotundifolia (Forst.f.) Hook. (Adiantaceae)	S, RF
Phymatosorus diversifolius (Willd.) Pic. Ser. (Polypodiaceae) = *Phymatodes diversifolium* (Willd.) Pic. Ser.	RF, F
P. scandens (Forst.f.) Pic. Ser. = *Phymatodes scandens* (Forst.f.) Presl	RF, F
Pneumatopteris pennigera (Forst.f.) Holttum (Thelypteridaceae) = *Thelypteris pennigera* (Forst.f.) Allan	RF, F
Polystichum richardii (Hook.) J. Smith (Dryopteridaceae)	S, RF, F
Pteridium aquilinum (Linn.) Kuhn var. *esculentum* (Forst.f.) Kuhn (Pteridaceae) bracken	abundant in S
Pteria macilenta A. Rich. (Pteridaceae)	RF, F
P. tremula R. Br.	RF, F
Pyrrosia serpens (Forst.f.) Ching (Polypodiaceae)	RF, F

Rumohra adiantiformis (Forst.f.) Ching (Dryopteridaceae) RF, F
Tmesipteris elongata Dang. (Psilotaceae) epiphyte mainly on tree ferns
Todea hymenophylloides A. Rich. (Osmundaceae) heruheru, Prince of Wales feather RF, F
Trichomanes endlicherianum Presl (Hymenophyllaceae) rare in RF, F

TREES AND SHRUBS

**Acacia dealbata* Link (Mimosaceae) silver wattle local at northern end of island.
Alectryon excelsus Gaertn. (Sapindaceae) titoki scattered in RF
Aristotelia serrata (J.R. et G.Forst.) W.R.B. Oliver (Elaeocarpaceae) wineberry scattered in RF
Beilschmiedia tawa (A.Cunn.) Benth. et Hook.f.ex Kirk (Lauraceae) tawa tall S, RF, F
Brachyglottis repanda J.R. et G. Forst. (Asteraceae) rangiora RF
Carpodetus serratus J.R. et G. Forst. (Escalloniaceae) putaputaweta, marbleleaf common in RF
Cassinia leptophylla (Forst.f.) R. Br. (Asteraceae) tauhinu, cottonwood common in S
**Chamaecyparis lawsoniana* (A. Murr.) Parl. (Cupressaceae) lawson cypress. A few trees at cottage site.
Coprosma australis (A.Rich.) Robinson (Rubiaceae) raurekau tall S, RF
C. colensoi Hook.f. tall S, RF
C. x cunninghamii Hook.f. tall S, RF
C. lucida J.R. et G.Forst. karamu In open areas near coast
C. propinqua A. Cunn. tall S, RF
C. rhamnoides A. Cunn. tall S, RF
C. robusta Raoul karamu common in open areas and S
C. rotundifolia A. Cunn. tall S, RF
Cordyline australis (Forst.f.) Endl. (Agavaceae) cabbage tree scattered in RF
Coriaria arborea Lindsay (Coriaceae) tree tutu S, RF
Corynocarpus laevigatus J.R. et G.Forst. (Corynocarpaceae) karaka. A few trees at cottage site and RF
Cyathodes fasciculata (Forst.f.) Allan (Epacridaceae) mingimingi common in S
**Cytisus monspessulanus* Linn. (Fabaceae) Montpelier broom scattered in S
**C. palmensis* (Christ) Hutch.tree lucerne local near cottage site
**C. scoparius* (Linn.) Link broom scattered in S
Dacrydium cupressinum Lamb. (Podocarpaceae) rimu single sapling in Waterfall stream.
Dodonea viscosa Jacquin (Sapindaceae) akeake scattered, especially near C
Dysoxylum spectabile (Forst.f.) Hook.f. (Meliaceae) kohekohe common in F with many seedlings, in gullies of RF
Elaeocarpus dentatus (J.R. et G.Forst.) Vahl (Elaeocarpaceae) hinau mainly in F, some seedlings in tall S
**Erica lusitanica* K. Rudolphi (Ericaceae) spanish heath common in S
**Eucalyptus globulus* Labill. (Myrtaceae) Tasmanian blue gum a few trees at cottage site.
**Ficus carica* Linn. (Moraceae) fig tree young plants at cottage site.

Fuchsia excorticata (J.R. et G.Forst.) Linn.f. (Onagraceae) kotukutuku, konini scattered in RF

**F. magellanica* Lam. Horitucultural plant at cottage site.

Gaultheria antipoda Forst.f. (Ericaceae) infrequent in tall S

Griselinia lucida Forst.f. (Cornaceae) puka a few scattered shrubs.

Haloragis erecta (Banks ex Murr.) Eichl. (Haloragaceae) S, RF

**Hebe salicifolia* (Forst.f.) Pennell (Scrophulariaceae) single plant at cottage site.

**H. speciosa* (A.Cunn.) Ckn. et Allan single plant at cottage site.

H. stricta (Benth.) L.B.Moore var. *atkinsonii* (Ckn.) L.B. Moore tall S, C

Hebe sp. infrequent in tall S

Hedycarya arborea J.R. et G. Forst. (Monimiaceae) pigeonwood, porokaiwhiri RF, F

Laurelia novae-zelandiae A. Cunn. (Monimiaceae) pukatea RF, F

Leptospermum ericoides A. Rich. (Myrtaceae) kanuka scattered in S

L. scoparium J.R. et G.Forst. manuka, physiognomically the most abundant plant on the island S

Lophomyrtus bullata (Sol. ex A.Cunn.) Burret (Myrtaceae) ramarama in tall S, RF

Macropiper excelsum (Forst.f.) Miq. (Piperaceae) kawakawa common in RF

**Malus pumila* Mill. (Rosaceae) apple at cottage site

Melicope ternata J.R. et G.Forst. (Rutaceae) wharangi infrequent in RF, F

Melicytus ramiflorus J.R. et G.forst. (Violaceae) mahoe, whitey-wood. abundant in RF all over island.

**Morus nigra* Linn. (Moraceae) black mulberry single tree at cottage site.

Myoporum laetum Forst.f. (Myoporaceae) ngaio scattered in C

Myrsine australis (A.Rich.) Allan (Myrsinaceae) mapou infrequent in tall S, RF

M. salicina Hew. ex Hook.f. RF

Nothofagus solandri (Hook.f.) Oerst. var. *cliffortioides* (Hook.f.) Poole (Fagaceae) mountain beech. Three small stands along main ridge.

N. truncata (Col.) Ckn. hard beech. A few trees in one of the *N. solandri* var.*cliffortioides* stands.

Olea lanceolata Hook.f. (Oleaceae) white maire RF

Olearia paniculata (J.R. et G.Forst.) Druce (Asteraceae) akiraho C, S

O. rani (A. Cunn.) Druce heketara C and tall S

O. virgata var. *serpentina* (Simpson) Allan S

Pennantia corymbosa J.R.et G.Forst. (Icacinaceae) kaikomako RF, F

**Physalis peruviana* Linn. (Solanaceae) cape gooseberry a few plants under tall S at the northern end of the island.

Pimelia prostrata (J.R. et G.Forst.) Willd. (Thymelaeaceae) S, C

**Pinus radiata* D.Don (Pinaceae) radiata pine, monterey pine scattered in S

Pittosporum crassifolium Banks et Sol. ex A.Cunn. (Pittosporaceae) karo S

P. tenuifolium Sol ex Gaertn. Kohuhu S

Plagianthus divaricatus J.R. et G. Forst. (Malvaceae) C

Podocarpus ferrugineus G.Benn. ex D.Don (Podocarpaceae) miro RF, F

P. hallii Kirk Hall's totara F

P. spicatus R. Br. ex Mirbel matai RF, F

* *Populus nigra* Linn. cv. 'Italica' (Salicaceae) Lombardy poplar single tree at cottage site.

Pseudopanax arboreus (Murr.) Philipson (Araliaceae) five finger abundant in S, RF
P. crassifolius (Sol. ex A.Cunn.) C. Koch lancewood common in S, RF
P. ferox Kirk rare in tall S, RF
P. arboreus (Murr.) Philipson x *crassifolius* (Sol.ex A.Cunn.) C.Koch S, RF
**Prunus cerasus* Linn. (Rosaceae) sour cherry small thicket at cottage site.
**Pyrus communis* Linn. (Rosaceae) pear single tree at cottage site.
Rhopalostylus sapida Wendl. et Drude (Palmae) nikau common in RF, F
**Rosa rubiginosa* Linn. (Rosaceae) sweet briar scattered in RF
**Salix caprea* Linn. (Salicaceae) willow single tree at cottage site.
**Sambucus nigra* Linn. (Caprifoliaceae) European elder local in S, RF
Schefflera digitata J.R. et G.Forst. (Araliaceae) pate, seven finger RF, F
Senecio sp. (Asteraceae) C
Solanum aviculare Forst.f. (Solanaceae) poroporo. A few plants near derelict wharf at northern end of the island.
Streblus heterophyllus (Bl.) Corner var. *elliptica* Kirk (Moraceae) = *Paratrophis banksii* Cheesem. milk tree infrequent in RF
**Tamarix chinensis* Lour. (Tamaricaceae) tamarisk, salt cedar at cottage site.
**Trachycarpus fortunei* (Hook.) H. Wendl. (Palmae) windmill palm single tree at cottage site.
**Ulex europaeus* Linn.(Fabaceae) gorse local in S on northern and western sides of island.
Weinmannia racemosa Linn.f. (Cunoniaceae) kamahi tall S, RF, F

VINES AND SCRAMBLERS

Calystegia tugurionum (Forst.f.) R.Br. ex Hook.F. (Convolvulaceae) RF
Clematis forsteri Gmel. (Ranunculaceae) RF, F
**C. vitalba* Linn. old man's beard spreading near the derelict wharf at the northern end of island.
Clematis sp. RF
Freycinetia banksii A. Cunn. (Pandanaceae) kiekie infrequent in RF, F
Metrosideros fulgens Sol.ex Gaetrn. (Myrtaceae) infrequent in RF, F
M. perforata (J.R. et G.Forst.) A. Rich. common in RF, F
Muehlenbeckia australis (Forst.f.) Meissen.(Polygonaceae) RF, F
M. complexa (A.Cunn.) Meissen. pohuehue rocky, open places, S, RF, F
Parsonsia capsularis (Forst.f.) R.Br. (Apocynaceae) New Zealand jasmine infrequent in RF, F
Ripogonum scandens J.R. et G.Forst. (Smilacaceae) supplejack, kareao RF, F
**Rosa* spp. (Rosaceae) Two species of climbing rose at cottage site.
Rubus cissoides A. Cunn. (Rosaceae) bush lawyer S, RF, F
Tetrapathea tetrandra (Sol.) Cheesem. (Passifloraceae) kohia RF, F
Vinca major Linn. (Apocynaceae) periwinkle. local in RF near derelict wharf at the northern end of the island.

HERBACEOUS DICOTYLEDONS

Acaena anserinifolia (J.R. et G.Forst.) Druce (Rosaceae) bidibidi G

Aciphylla subflabellata W.R.B. Oliver (Apiaceae) spaniard C
Aciphylla sp. rare in C
**Anagallis arvensis* Linn. (Primulaceae) scarlet pimpernel G
Apium australe Thouars (Apiaceae) New Zealand celery common in C
Atriplex triangularis Willd. (Chenopodiaceae) C
**Brassica rapa* Linn. ssp. *sylvestris* (Linn.) Janchen (Brassicaceae) wild turnip single plant on stoney beach in North-eastern Bay
**Centaurium erythraea* Raf. (Gentianaceae) centaury common in G
**Cirsium vulgare* (Savi) Ten. (Asteraceae) Scotch thistle rare in G
**Crepis capillaris* (Linn.) Wallr. (Asteraceae) hawksbeard common in G
**Dianthus armeria* Linn. (Caryophyllaceae) deptford pink common in G
Dichondra repens J.R. et G. Forst. (Convulvulaceae) Mercury Bay weed infrequent in C, G and S
**Digitalis purpurea* Linn. (Scrophulariaceae) foxglove rare in G
Disphyma australe (Sol.) J.M.Black (Aizoaceae) horokaka abundant in C
**Erigeron floribundus* (HBK). Sch.-Bip. (Asteraceae) fleabane. common in G
**Galium aparine* Linn. (Rubiaceae) cleavers infrequent in G, S
**Geranium potentilloides* Hook.f. (Geraniaceae) common in G, C
Gnaphalium luteo-album Linn. (Asteraceae) common in C, G
Gnaphalium sp. common in C, G
Hydrocotyle novae-zealandiae D.C. (Apiaceae) common in G, S
**Hypericum humifusum* Linn. (Hypericaceae) trailing St.John's wort G
**Hypochoeris radicata* Linn. (Asteraceae) cat's ear common in G
**Lepidium pseudo-tasmanicum* Thell. (Brassicaceae) infrequent in G, S
**Linum marginale* A.Cunn. (Linaceae) Australian flax infrequent in C, G
Linum monogynum Forst.f. infrequent in G, C
Lobelia anceps Linn.f. (Lobeliaceae) common in C
**Lotus angustissimus* Linn. (Fabaceae) rare in G
**Mentha suaveolens* J.F.Ehrh (Lamiaceae) apple mint at cottage site.
**Orobanche minor* Linn. (Orobanchaceae) broomrape common in G
Oxalis corniculata agg. (Oxalidaceae) infrequent in G and open places.
Oxalis incarnata Linn. infrequent in G and open places
Peperomia urvilleana A.Rich. (Piperaceae) common in C
**Plantago hirtella* H.B. and K. (Plantaginaceae) infrequent in G
**P. lanceolata* Linn. narrow-leaved plantain infrequent in G
**P. major* Linn. broad-leaved plantain infrequent in G
**Plectranthus ciliatus* E.H.Mey. (Lamiaceae) at cottage site.
**Polycarpon tetraphyllum* Linn. (Caryophyllaceae) allseed open places, C
Ranunculus acaulis Banks et Sol. ex DC. (Ranunculaceae) shore buttercup on shingle beaches near water seepage from creeks.
R. hirtus Banks et Sol. ex DC. forest buttercup common all over the island in S, RF
Rhagodia triandra (Forst.f.) Aellen (Chenopodiaceae) common in C
**Rumex acetosella* Linn. (Polygonaceae) sheep's sorrel common in open places.
**R. conglomeratus* Murr. clustered dock common in G and open places.
**R. obtusifolius* Linn. broad-leaved dock common in G
**Sagina procumbens* Linn. (Caryophyllaceae) pearlwort damp open places.
Scleranthus biflorus (J.R. et G.Forst.) Hook.f. (Caryophyllaceae) C
**Senecio glastifolius* Linn.f. (Asteraceae) rare in G
**S. jacobaea* Linn. ragwort rare in G
S. lautus Willd. shore groundsel common in C

S. minimus Poir. G and open places
S. quadridentatus Labill. G and open places
**Silene gallica* Linn. (Caryophyllaceae) catchfly common in G
**Solanum tuberosum* Linn. (Solanaceae) potato a few plants at cottage site.
**Sonchus oleraceus* Linn. (Asteraceae) sowthistle rare in G
Spergularia marginata (DC.) Kittel (Caryophllaceae) C
Stellaria parviflora Banks et Sol. ex Hook.f. (Caryophyllaceae) bush chickweed damp, shady places.
**Trifolium dubium* Sibth. (Fabaceae) suckling clover rare in G
**T. repens* Linn. white clover rare in G
**Vicia sativa* Linn. (Fabaceae) common vetch infrequent in G
Wahlenbergia gracilis (Forst.f.) Schrad (Campanulaceae) G

HERBACEOUS MONOCOTYLEDONS

Agropyron scabrum (Lab.) Beauv. (Poaceae) G
**Agrostis tenuis* Sibth. (Poaceae) browntop abundant in G and open places.
**Aira caryophyllea* Linn. (Poaceae) silvery hair grass G
**Anthoxanthum ordoratum* Linn. (Poaceae) sweet vernal abundant in G and open places.
Arthropodium cirratum (Forst.f.) R.Br. (Liliaceae) rengarenga, rock lily common in C
**Asparagus officinlis* Linn. (Liliaceae) asparagus at cottage site only.
Astelia fragans Col. (Liliaceae) infrequent in S, RF, F
**Bromus mollis* Linn. (Poaceae) G
**B. unioloides* Kunth prairie grass common in G
Carex coriacea Hamlin (Cyperaceae) in damp places
**Crocosmia x crocosmiiflora* (Nicholson) N.E. Brown (Iridaceae) montbretia Horticultural plant at cottage site.
Cyperus ustulatus A. Rich. (Cyperaceae) in damp places where creeks enter the sea, local.
Dactylis glomerata Linn. (Poaceae) cocksfoot common in G
Dianella nigra Col. (Liliaceae) turutu, blue-berry, ink berry, common in tall S, RF
Dichelachne crinita Hook.f. (Poaceae) plume grass G
**Festuca arundinacea* Schreb. (Poaceae) tall fescue G
Gahnia setifolia (A.Rich.) Hook.f. (Cyperaceae) infrequent in S
**Holcus lanatus* Linn. (Poaceae) Yorkshire fog G
**Iris foetidissima* Linn. (Iridaceae) stinking iris at cottage site
**Juncus bufonius* Linn. (Juncaceae) mainly in damp places
**Kniphofia* sp. (Liliaceae) Horticultural plant establishing at cottage site.
Libertia ixioides (Forst.f.) Spreng. (Iridaceae) native iris common in S, RF, F
**Lolium multiflorum* Lam. (Poaceae) Italian ryegrass G
**L. perenne* Linn. perennial ryegrass G
Luzula banksiana Meyer var. *banksiana* (Juncaceae) open areas and in light S
Microtis sp. (Orchidaceae) G
Notodanthonia unarede (Raoul) Zotov (Poaceae) G
Phormium cookianum Le Jolis (Agavaceae) whareriki, mountain flax C, light S
Poa laevis R.Br. (Poaceae) silver tussock infrequent in S, often with *Phormium cookianum*.

Prasophyllum sp. (Orchidaceae) G
Pterostylis sp. (Orchidaceae) G
Scirpus cernuus Vahl (Cyperaceae) C on rocks and in damp places.
S. nodosus Rottb. (Cyperaceae) in damp seepages where creeks enter the sea.
Spiranthes sinensis (Pers.) Ames (Orchidaceae) G, S
Thelymitra sp. (Orchidaceae) G, S
Trisetum antarcticum Trin. (Poaceae) G
Uncinia uncinata (Linn.f.) Kuk. (Cyperaceae) hook sedge common S, RF, F
**Zantedeschia aethiopica* (Linn.) Sprengel (Araceae) arum lily.
Horticultural plant becoming established at cottage site.

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